



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/845,356	05/01/2001	Masayuki Mishima	Q64324	2603
7590 05/05/2004 SUGHRUE, MION, ZINN, MACPEAK & SEAS, PLLC 2100 Pennsylvania Avenue, N.W. Washington, DC 20037			EXAMINER YAMNITZKY, MARIE ROSE	
			ART UNIT	PAPER NUMBER
			1774	

DATE MAILED: 05/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/845,356

Applicant(s)

MISHIMA, MASAYUKI

Examiner

Marie R. Yamnitzky

Art Unit

1774

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 25-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 25-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- 1) ☐ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

1. This Office action is in response to Applicant's amendment filed January 28, 2004, which cancels claims 1-8 and 10-24, and adds claims 25-32.

Claims 25-32 are pending.

2. The rejections set forth in the Office action mailed July 28, 2003 are rendered moot by the cancellation of the rejected claims.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 25-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baldo et al. in *Appl. Phys. Lett.* 75(1), pp. 4-6 (July 5, 1999) or Forrest et al. (US 6,310,360 B1), either reference in view of Egusa et al. (US 5,294,810).

Baldo et al. disclose light-emitting devices comprising a glass substrate, an anode, an organic compound layer including a light-emitting layer containing two light emitting materials, and a cathode. See the whole reference. In various devices, the light-emitting layer contains Ir(ppy)₃ and CBP. Baldo et al. also disclose a device in which the light-emitting layer contains Ir(ppy)₃ and Alq₃.

Forrest et al. disclose light-emitting devices comprising a glass substrate, an anode, an organic compound layer including a light-emitting layer/zone containing three light emitting materials, and a cathode. See the entire patent to Forrest et al. In particular, see Fig. 1, Fig. 3, column 9, line 1 - c. 11, l. 60, c. 12, l. 58 - c. 13, l. 50, c. 14, l. 63 - c. 15, l. 17 and c. 17, l. 9 - c. 19, l. 19. Note that c. 11, l. 57 contains an error in that λ for Ir(ppy)₃ should read --~500 nm-- rather than "~400 nm". In Forrest's Example 1, the light-emitting layer consists of an alternating series of layers of CBP doped with Ir(ppy)₃ and CBP doped with DCM2.

"CBP" stands for 4,4'-N,N'-dicarbazole-biphenyl, which is a blue light-emitting material having a light-emitting wavelength peak of about 400 nm.

"Ir(ppy)₃" stands for *fac* tris(2-phenylpyridine) iridium, which is a green light-emitting orthometallated complex of iridium having a light-emitting wavelength peak of about 500 nm.

"Alq₃" stands for tris-(8-hydroxyquinoline) aluminum, which is a green light-emitting material.

"DCM2" is the abbreviation for a pyran compound that is a red light-emitting compound having a light-emitting wavelength peak of about 590 nm (the full name is given at c. 4, l. 56-58 and the formula is shown at the bottom of c. 9 of the patent to Forrest et al.).

Baldo et al. or Forrest et al. disclose devices comprising more than one light-emitting material, each of the materials capable of emitting light of a different color, wherein one of the materials is an orthometallated complex. In Baldo's device comprising CBP doped with Ir(ppy)₃, a single light-emitting layer contains green and blue light-emitting materials. In Forrest's device of Example 1, green and blue-light emitting materials are contained in one light-

Art Unit: 1774

emitting layer while red and blue-light emitting materials are contained in a second light-emitting layer.

The prior art devices of Baldo et al. or Forrest et al. do not comprise red, green and blue light-emitting materials mixed in a single layer as required by claim 25, with claims 26-28 and 30-32 dependent directly or indirectly therefrom, and do not comprise separate red, green and blue light emitting layers as required by claim 29. The prior art devices of Baldo et al. or Forrest et al. do not emit white light as required by the present claims.

Further, in the devices of Baldo et al. or Forrest et al., the light-emitting layer(s) only comprise(s) one orthometallated complex rather than at least two as required by present claims 26 and 30, or at least three as required by present claims 27 and 31.

It was known in the art at the time of the invention that the color of light emitted by a light-emitting device can be controlled by the selection of light-emitting materials used in the device, and that emission of white light can be achieved by providing an appropriate combination of light-emitting materials.

Egusa et al. disclose light-emitting devices, teach that a light-emitting device may comprise more than one light-emitting layer (e.g. see column 11, line 40 - c. 12, l. 60 and c. 19, l. 52 - c. 20, l. 61), teach that different light-emitting materials may be mixed in a light-emitting layer in order to control light-emission wavelength and that the mixture may include a phosphorescent material emitting light from a triplet excited state (e.g. see c. 25, l. 36 - c. 27, l. 15), and teach that it is possible to achieve emission of white light from a device comprising

multiple light-emitting layers and from a device comprising a mixture of light-emitting materials (e.g. see c. 20, l. 57-61 and c. 26, l. 15-28).

It would have been an obvious modification to one of ordinary skill in the art at the time of the invention to provide light-emitting devices similar to those disclosed by Baldo et al. or Forrest et al. but utilizing different and/or additional light-emitting materials in combination with the iridium complex either in the same layer or in a light-emitting layer separate from the layer comprising the iridium complex. One of ordinary skill in the art would have been motivated to utilize different and/or additional light-emitting materials in combination with the iridium complex so as to provide a device having the advantages of using a phosphorescent material as taught by Baldo et al. or Forrest et al. while at the same time being able to modify the color of light emitted by the device as taught by Egusa et al. It would have been within the level of ordinary skill of a worker in the art at the time of the invention, as a matter of routine experimentation, to determine suitable and optimum combinations of light-emitting materials selected from known light-emitting materials so as to obtain a functional device capable of emitting light of the color(s) desired. One of ordinary skill in the art would have been motivated to select a combination of light-emitting materials capable of providing white light when the light-emitting device was intended to be used for an application where white light was desirable.

With respect to claim 28, with claims 30-32 dependent therefrom, one of ordinary skill in the art at the time of the invention would have recognized that in order to provide a white light emitting device as taught by Egusa et al., a device would have to be provided with two or more

Art Unit: 1774

light-emitting materials that emit light when an electric field is applied across the electrodes of the device.

With respect to the requirement for more than one orthometallated complexes as in claims 26, 27, 30 and 31, Baldo et al. or Forrest et al. disclose an orthometallated complex that is a green light-emitting material, and orthometallated complexes that emit blue or that emit red are known. The selection of suitable and optimum combinations of red, green and blue light-emitting materials from known materials in order to achieve white light would have been within the level of ordinary skill of a worker in the art at the time of the invention as a matter of routine experimentation.

5. Applicant's arguments filed January 28, 2004 have been fully considered but they are not persuasive.

Applicant argues that even if there might be motivation to combine the references, and applicant does not concede that there is motivation, the combination does not result in the present invention in which red, green and blue light-emitting materials are used and at least one of the light-emitting materials is an orthometallated complex.

Each of the primary references and the secondary reference pertains to organic EL devices and each discloses that multiple light-emitting materials may be used in combination in an organic EL device. The primary references establish that an orthometallated complex as required by the present claims was known in the art at the time of the invention to be a suitable light-emitting material for an organic EL device. The secondary reference establishes that it was

Art Unit: 1774

known in the art at the time of the invention that organic EL devices that emit white light can be obtained by selecting an appropriate combination of light-emitting materials, including combinations of red, green and blue light-emitting materials. The secondary reference also establishes that it was known in the art at the time of the invention that materials exhibiting phosphorescent emission can be used in a mixture of light-emitting materials when making an organic EL device. The orthometallated complex used in the primary references exhibits phosphorescent emission.

The secondary reference provides motivation to use red, green and blue light-emitting materials in order to provide a device capable of emitting white light, and either of the primary references provides motivation to use an orthometallated complex as a light-emitting material. It is the examiner's position that the motivation to combine the references lies in the advantages to be attained by the use of an orthometallated iridium complex as taught by either primary reference while being able to modify the color of light emitted from the device as taught by the secondary reference.

6. Applicant is advised that should claim 28 be found allowable, claim 32 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Art Unit: 1774

Applicant may want to amend claim 32 (and possibly claims 30 and 31) to depend from claim 29 instead of from claim 28.

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

8. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 6:30 a.m. to 4:00 p.m. Monday, Tuesday, Thursday and Friday, and every other Wednesday from 6:30 a.m. to 3:00 p.m.

The current fax number for Art Unit 1774 is (703) 872-9306 for all official faxes. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

MRY
May 03, 2004

Marie R. Yamnitzky

MARIE YAMNITZKY
PRIMARY EXAMINER

1774